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THE GOLD REGIONS OF THE STRAIT OF MAGELLAN
AND TIERRA DEL FUEGO

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LOCATION OF THE REGION¹

The Strait of Magellan intersects the southern end of South America from east to west. To the north of the strait is Patagonia, to the south of it is the archipelago of Tierra del Fuego. Both these regions are owned partly by Chile and partly by the Argentine Republic. The dividing line follows the Andes southward in Patagonia to the Strait of Magellan, thence eastward for some distance along the strait, and thence southward again through Tierra del Fuego, giving most of that archipelago to Chile, but an important part on the eastern side to Argentine. The Chilean possessions in the Magellan region, on both sides of the strait, are officially known as the Territory of Magallanes, a term locally abbreviated to simply "Magallanes."

Patagonia represents the southern end of the mainland of South America, terminating at Cape Froward, in the Strait of Magellan. The name Tierra del Fuego properly belongs to the whole archipelago of islands lying south of the Strait of Magellan and north of Cape Horn, though sometimes it is applied to the one large island which comprises most of the land area of the group and which is often

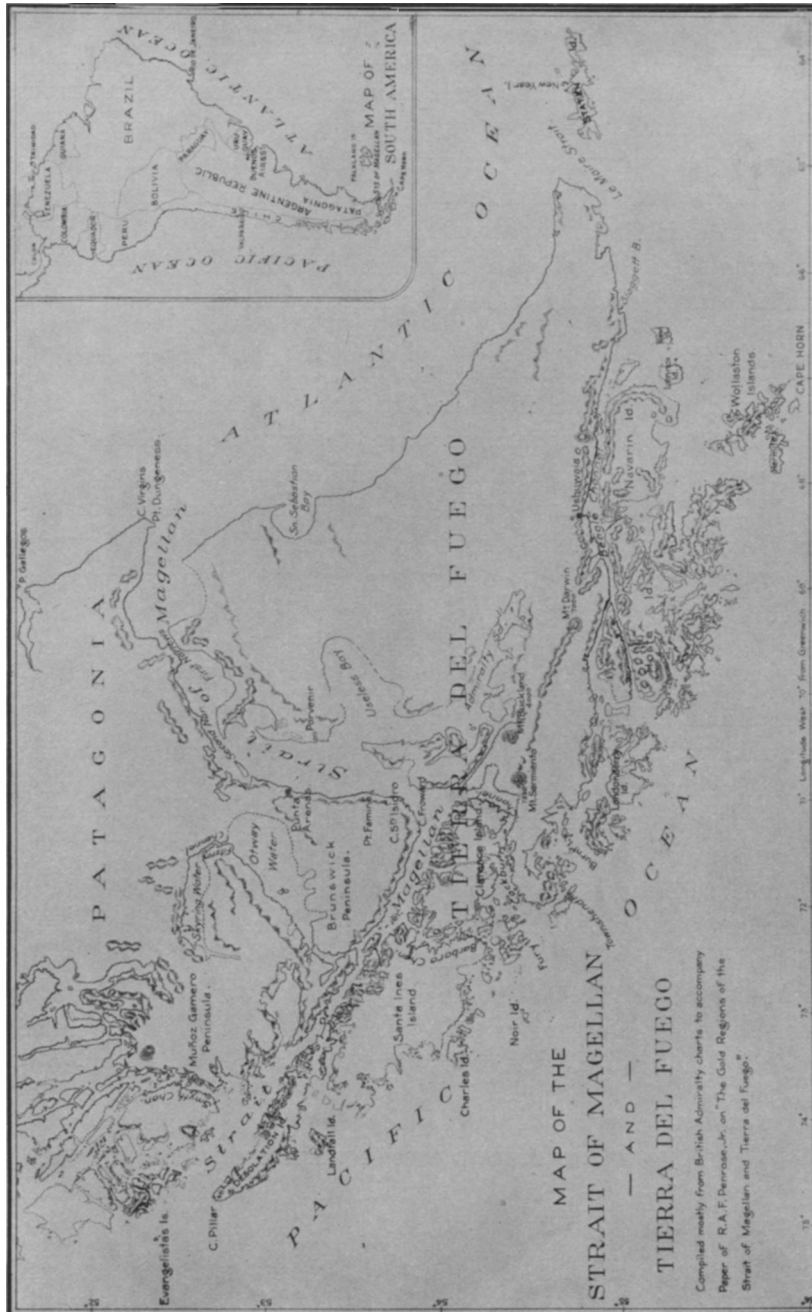
¹ During the year 1907 the writer twice visited the Strait of Magellan and had an opportunity to learn something of the gold-mining industry of that region. Other researches in South America prevented his making a special study of the deposits on which this industry has been built up, but it is hoped that the following general account of the occurrence and environment of the gold in this little-known region may be of some interest.

locally known as "the island," in distinction from the others. In the present paper the name *Tierra del Fuego* will be used to indicate the whole archipelago, and, as thus defined, it consists of one large island and many smaller ones. It comprises an area extending about 500 miles in a direction from northwest to southeast and about 200 miles in a direction from northeast to southwest, and from about $52^{\circ} 30'$ to almost 56° south latitude. The two main tidewater channels are the Strait of Magellan on the north and Beagle Channel near the southern part, intersecting the region from east to west. Between these two, and also south of Beagle Channel, are numerous other minor and transverse channels, dividing the archipelago into the many islands of which it is composed. (See map.)

GEOLOGY AND TOPOGRAPHY OF THE REGION

The western part of Patagonia is comprised in the main range of the Andes, dropping off abruptly on the Pacific side, while the eastern part is comprised in the low rolling country known as the pampas, sloping gradually to the Atlantic. South of the Strait of Magellan, in *Tierra del Fuego*, the western and southern parts of the archipelago are rugged and mountainous, some of the peaks rising from about 3,000 to about 7,000 feet above the sea. (See Fig. 2.) This region represents the southern extension of the Andes, which here turn from their usual north-and-south course to a northwest-and-southeast course, and then to an east-and-west course, finally terminating in the rugged Staten Island, the most easterly member of the archipelago. The northeastern part of the main island of *Tierra del Fuego*, however, is a more or less flat or rolling country, and partakes of the nature of the pampas of eastern Patagonia. In fact, just as the mountainous districts of *Tierra del Fuego* are the southerly extension of the Andes, so this part of the main island is geologically the southern extension of the pampas.

Tierra del Fuego probably owes its condition as a group of islands, instead of as a continuous land area, to a partial submergence of the southern end of South America. The numerous small but high and mountainous islands dropping off precipitously into the sea, following each other in quick succession along certain directions and separated by deep but narrow tidewater channels, strongly suggest what the



higher Andes range to the north would look like if it were submerged sufficiently to permit the sea to invade its lower parts. The islands appear to be the upper parts of old mountain peaks, and the numerous straits, channels, and bays, with their great depth and precipitous sides, appear to mark the courses of the old canyons and valleys now submerged. Whether the submergence is now at the maximum depth to which it has ever reached, or whether there has been some uplifting since the period of maximum submergence, is a question which cannot be fully discussed within the limits of the present article.

The rocks of southern Patagonia and Tierra del Fuego have not been much studied, but from the little that is known of them, it may be said that in the mountainous areas they are much like those of other parts of the southern Andes, granites, various igneous rocks, and slates being common; while in the low pampas country in eastern Patagonia and the northeast part of the main island of Tierra del Fuego, more or less soft, sandy and argillaceous strata predominate, probably belonging mostly to the Mesozoic and Cenozoic eras. Not only in its geology but in other respects, a large part of southern Patagonia and Tierra del Fuego is a little-known country. Various expeditions, especially those of the British ships the *Adventure* and the *Beagle*, have prepared good charts of the strait and neighboring waters, with accurate measurements of the depth of water and other nautical data most valuable to the navigator. These observations have been supplemented by later Chilean, American, French, and other expeditions. The outlines of most of the land-areas have also been fairly accurately mapped, and some of the mountains have been plotted and measured, but there are vast areas of country almost unknown beyond their shore lines. The advent of the sheep-raiser and the miner are rapidly giving us knowledge of some of these regions, but such information, though better than nothing, is necessarily vague.

DISCOVERY AND DISTRIBUTION OF THE GOLD DEPOSITS

Gold is said to have been discovered in southern Patagonia by the Chileans over forty years ago, and is supposed to have been known to the native Indians at a much earlier date, but it has been

produced in quantities sufficient to attract general attention only in the last twenty to twenty-five years. The gold in the gravels of Rio de las Minas, near Punta Arenas, was one of the earliest discoveries, and a number of miners soon began to work there. Another early discovery was the gold in the beach sands near Cape Virgins, at the eastern entrance of the Strait of Magellan, which was first discovered about 1876, but not actively worked until 1884. Then considerable excitement followed and prospecting parties overran a large part of southern Patagonia and Tierra del Fuego. An Austrian named Mr. Julius Popper was among the most active operators at that time, especially on the east coast of the main island of Tierra del Fuego. The search continued for several years with more or less activity,

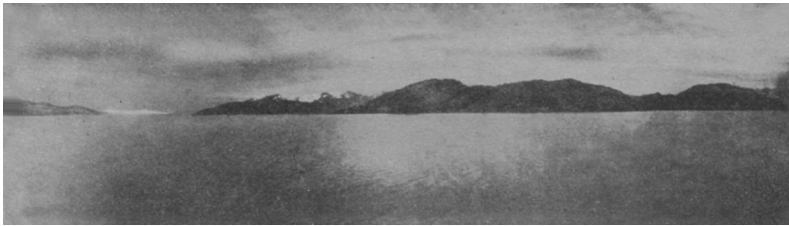


FIG. 2.—A view in the Strait of Magellan.

sometimes the excitement subsiding, and sometimes breaking forth again when an especially rich discovery was made.

During this time, gold was found and actively worked in many places on both sides of the Strait of Magellan, but the principal localities were the following: the gravels in the Rio de las Minas near Punta Arenas; the beaches at Cape Virgins and from there southwestward along the shore to Point Dungeness; the gravels on several small streams to the eastward of where Porvenir now stands, across the strait from Punta Arenas; the beach at Paramo northeast of San Sebastian Bay, on the east coast of the main island of Tierra del Fuego; Navarin Island, Lennox Island, New Island, and Sloggett Bay in the extreme southern part of the archipelago near Cape Horn; New Year Island which lies north of Staten Island, at the eastern end of the archipelago; and several localities in the western islands of the archipelago. In fact, gold has been found to be very generally distributed almost all through the Magellan region, though

only in certain localities has it been profitably worked. Most of the important localities yet discovered are in the archipelago of Tierra del Fuego, though a few, such as on the beaches at Cape Virgins and Point Dungeness, are in Patagonia, on the north shore of the Strait of Magellan; and gold is also found in places along the southern coast of Chile, for some distance north of the Strait of Magellan.

About the year 1904 the preparations to use steam dredges in handling the gold-bearing gravel started afresh the boom that had



FIG. 3.—The town of Porvenir, Tierra del Fuego.

for a time been more or less quiescent. The old method of working the mines had been by hand, gathering the gold in pans, sluice-boxes, or other similar appliances. With the introduction of steam dredges, however, it became possible to handle the gravel much more cheaply and in much larger quantities. From all over Chile and Argentine again came the gold-seekers, with some from a still greater distance, and the usually almost deserted Strait of Magellan became animated with small craft. Since that time, though the excitement has subsided, work on the gold deposits has steadily progressed, and in a much more systematic manner than formerly. There were in

1907 some twelve or thirteen dredges in operation or being constructed, and the gold industry of the region promises soon to become a far more important business than in the days of handwork. The most active man in introducing the dredges has been an American, Mr. John D. Roberts, who for some years has been engaged in developing the gold industry of this region. The dredges are not used in handling the beach deposits, as the fury of the storms would soon batter them to pieces, and their use has so far been confined to the inland deposits.

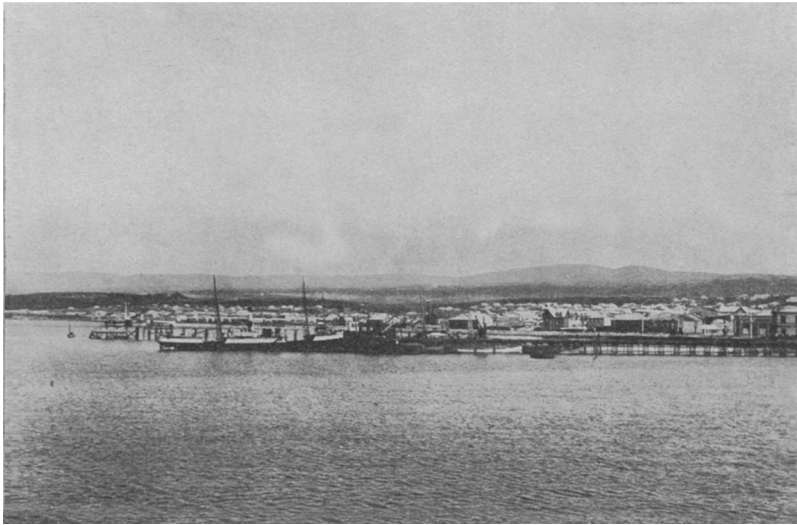


FIG. 4.—The town of Punta Arenas, Strait of Magellan.

Until recently the largest gold-mining operations were at Paramo and Lennox Island, but since the introduction of the dredges, the most active operations are on the northwestern part of the main island of Tierra del Fuego, just across the strait from Punta Arenas. Here the town of Porvenir is the headquarters of the industry. This town has been a small settlement for some years, but it jumped into prominence in the gold boom of 1904, and is now a prosperous mining center of about 800 people. (See Fig. 3.) The mines are mostly some miles, and often many miles, from Porvenir, but the town is the supply point and the port at which the boats of the miners land.

In addition to the Porvenir region, mining on a smaller scale, but of more or less importance, is still going on at some of the other localities already mentioned.

The chief center of civilization in the whole region is the Chilean town of Punta Arenas, a name which in English means Sandy Point, and which refers to the spit of sandy land on which it is built. The town is on the Patagonian side of the Strait of Magellan and has a fairly good harbor. It is the seat of government in this part of the



FIG. 5.—Gold-bearing alluvium on the Rio del Oro, Tierra del Fuego.

Chilean possessions and is a very active place of some 12,000 people. (See Fig. 4.) It is the only large town in the Magellan region. The settlement of Ushuwaia, which is the seat of government of the Argentine part of Tierra del Fuego, is only a very small place, while several small mining or fishing camps, of which Porvenir is the largest, together with a few missionary posts, none of them containing more than a few persons, complete the list of settlements in this region. Punta Arenas is in $53^{\circ} 9' 42''$ south latitude, and has the distinction of being the most southerly town of any considerable size in the southern hemisphere. Some of the places mentioned above are still

further south, and Ushuwaia is in almost 55° south latitude, but they are all very small settlements.

Punta Arenas was started by the Chilean government as a penal colony in 1843, but its location at that time was somewhat further south than at present. A few years later, in 1849, the settlement was moved to where it now stands. In the early days of Punta Arenas it was the scene of much disturbance, and on more than one occasion frightful bloodshed and massacre on the part of the convicts have



FIG. 6.—Gold-bearing alluvium on the Rio Pararich, Tierra del Fuego.

blackened its history. The Chilean government finally ceased using it as a penal colony and encouraged its settlement by free Chileans. For a long time it was the headquarters for sealing and whaling vessels, until the seals and whales became so nearly exterminated that the industry began to wane. It was also the wrecking headquarters for the Magellan region, and the many ships that were in distress or were dashed to pieces in the storms of this inhospitable region received the attention of the Punta Arenas wreckers.

In recent years, however, Punta Arenas has prospered greatly along other lines, first by the development of the sheep industry in Patagonia

and later by the advent of the gold miner. Its population is of a most cosmopolitan character, comprising, besides the native Chileans, many Austrians and a considerable number of Argentines, Germans, and English, as well as some Americans, French, and others. Punta Arenas bears much the same relation to the Far South as Dawson City, on the Yukon River, does to the Far North, both being isolated settlements on the borders of opposite polar regions, where, for vast distances, there is no other civilization; and though they are not



FIG. 7.—Gold-bearing alluvium on the Rio Verde, Tierra del Fuego.

large cities, their very isolation gives them a metropolitan air, for they are dependent on themselves for protection, amusement, and the general facilities of civilization. The one is the Antarctic metropolis and the other the Arctic metropolis of the Western Hemisphere; beyond both, civilization ceases.

MODE OF OCCURRENCE OF THE GOLD DEPOSITS

The gold of the Magellan region, including the Strait of Magellan and Tierra del Fuego, is, so far as at present known, most all in alluvial, or placer, deposits. Very few gold-bearing veins have been

found, though it may be said that, in a region so difficult as this is to prospect, gold-bearing veins might readily be overlooked. The alluvial deposits may be divided into two classes, those in beds of creeks or on hillsides, and those on sea beaches where they are subject to the action of the sea during rising and falling tides and during storms.

The alluvial deposits in beds of streams or on hillsides vary in gold contents from a few cents to a dollar or more per cubic yard,

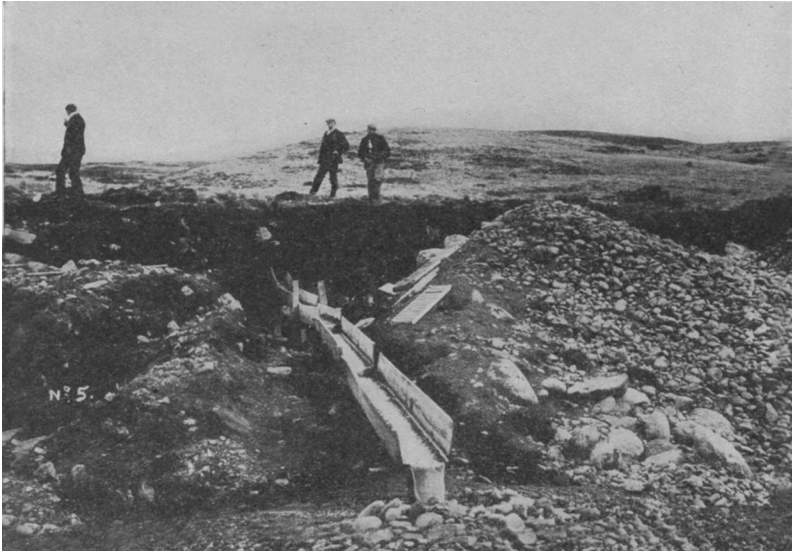


FIG. 8.—Gold-bearing alluvium on the Rio Verde, Tierra del Fuego.

and sometimes, though less commonly, are considerably richer, but most of the ground that is now worked is said to range from twenty-five cents to fifty cents per yard. Under the conditions existing in the region, it is difficult to make very low grade ground pay, but some of the operators expect eventually, with steam dredges, to make a profit on very considerably lower-grade ground than they are working now. The gold-bearing beds vary from a few feet to many feet in thickness, ten to thirty feet or more being not uncommon. (See Figs. 5, 6, 7, 8, and 9.) An "overburden," or capping of barren ground, of variable thickness often occurs.

The gold on the beaches is sometimes on the immediate surface and sometimes covered by from a few inches to several feet of barren sand. On some beaches it is well up on the shore, on others it is near the water level and on still others it is below the water level. The sandy strata carrying the gold are rarely over a few inches in thickness, but often very rich. The gold is associated with large quantities of black sand, which seems to be mostly magnetite, and numerous small garnets.



FIG. 9.—Gold-bearing alluvium on the Rio Santa Maria, Tierra del Fuego.

The gold, whether from the creeks, hillsides, or beaches, is said to be quite pure, though it contains often a little copper and silver. It occurs generally in rather fine particles, but sometimes small nuggets, often flat and about the size of lima beans, occur, and occasionally still larger ones are found, but no very great nuggets have yet been discovered. The rarer minerals which occur in some other gold districts, like diamond, sapphire, topaz, etc., are said not to be found in this region, though a closer study of the deposits might reveal the presence of some of them.

As regards the origin of the gold deposits of the Magellan region,

it may be said that the alluvial deposits in the creeks and on the hillsides have doubtless been derived from the erosion of gold-bearing rocks, and though such rocks have not yet been found to any great extent in the region, they nevertheless probably exist and may sometime be discovered. If the Magellan region represents the partly submerged southern end of the continent, as already mentioned in this paper, many of these deposits may have been originally formed as ordinary alluvial deposits high up in the mountains, and brought down during the sinking era to a much lower level, while some of them may have been completely submerged in the sea. The gold in the beaches probably came largely from the later erosion of the alluvium in the creek beds and on the hillsides, and perhaps partly from old submerged alluvium from which the gold was thrown up by the sea. In either case the gold has been further concentrated by being washed over and over again on the beaches. It is said that the beaches, after having been carefully worked for gold, seem again to become rich in that metal after a storm or an unusually high tide.¹ This phenomenon is probably due partly to the action of the waves and currents in concentrating the gold which the imperfect methods of the miners have left behind in the sand, and partly to the washing up of fresh gold-bearing sand from depths that are undisturbed in ordinary weather or by ordinary tides. So well recognized is this enriching of the beaches, that the miners, after working all the sand that can be profitably handled, wait for the next storm or very high tide to come, and then wash the same spots over again with a good profit.

The ordinary tides in the eastern part of the Strait of Magellan have a rise and fall of 30 feet or more, and the spring tide, 45 or 50 feet, though in the western part of the strait the tides have a much less rise and fall. The great rise and fall of the tides on the Atlantic side cause rapid currents in the strait, often with a velocity of 7 or 8 knots an hour, and these, scouring the beaches backward and forward, must have a very marked effect in concentrating the gold. When we consider that a river, flowing always in one direction, has a wonderful power to concentrate gold in the gravel in its bed, a much

¹A similar phenomenon is observable in the gold-bearing beach sands of Cape Nome, Alaska.

greater concentrating power would seem to be possessed by a channel like the Strait of Magellan, where the tides run as fast as a very swift river, and where they reverse their direction four times a day; for in water running always one way, gold may become covered and protected from further concentrating action, but in water running first one way and then another, gold that may be covered when the water runs in one direction, may be uncovered and moved about when the direction is reversed, eventually becoming more closely concentrated. In fact, the conditions in the Strait of Magellan represent a natural process of concentration, not at all unlike some of the artificial processes that man has found best suited for concentrating gold.

METHODS OF PROSPECTING

Prospecting in the Strait of Magellan and Tierra del Fuego is a more difficult task than in most places, and many a man has lost his life in his search for gold in that bleak, inhospitable region, while many more have rapidly become discouraged and returned to milder climates. Most of the traveling is done in boats, as the land is much cut up by deep tidewater channels and bays, and covered with dense underbrush or immense peat bogs; while everywhere, even on the mountain sides, the soil is soft and boggy, so that walking is difficult and often impossible. Hence traveling in boats and stopping from place to place along the shore is the most practical way of prospecting; but here again another difficulty comes in, as the storms are frequent and violent, and many a vessel has been hurled on the rocks and everyone in her lost. The climate, however, though stormy, is not extreme in temperature, the thermometer rarely going much below zero or much above 60° Fahrenheit. The mean winter temperature is about 33° F. and the mean summer temperature is about 50° F.

The natives, until recently, have been a considerable check to the progress of mining. Many of them still use the bow and arrow of their ancestors, and have fiercely opposed the invasion of the white man; yet the sad fate of most American Indians is rapidly overtaking them, and they will probably soon vanish before the miners and the cattlemen.

Aside from the difficulties of prospecting, the industrial conditions under which gold is worked in this region are not as expensive as

might at first be supposed. General supplies can be obtained at Punta Arenas at reasonable prices, for it is a seaport and supplies are brought there by ocean steamers at fairly cheap rates. The most expensive item is coal, and this is brought mostly from foreign countries. There is a small deposit of lignitic coal worked at what is known as the Loreto mine, a short distance from Punta Arenas, but the production is very limited and does not go far toward supplying the needs. There is also coal near Coronel and Lota on the Chilean coast, south of Valparaiso, but this is mostly used locally and by ocean steamers. In some parts of Tierra del Fuego there is a good deal of timber of the magnolia, beech, and other varieties, which can be used as fuel, but in other localities it is scarce. All over the region there is a great deal of peat, and efforts are now being made to use this as fuel.

The season during which mining can profitably be carried on is about eight or nine months, from August to May, while during the rest of the year frost and snow hinder operations. The capital at present invested in the industry is mostly Chilean and Argentine, but it seems probable that, as the region becomes better known, other capital may be attracted to the gold deposits of this far-south country. No very definite statistics of the production of gold in the early days in the region are obtainable, but until recently it has been small, and probably not very many hundreds of thousands of dollars had been produced up to the time of the introduction of the steam dredges. With these, however, the production will probably be greatly increased.